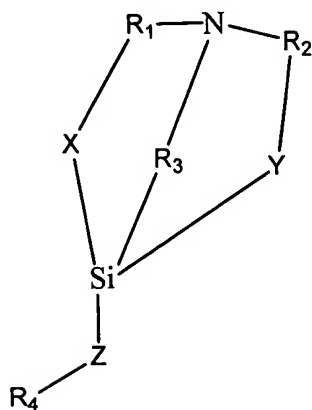


What is claimed is:

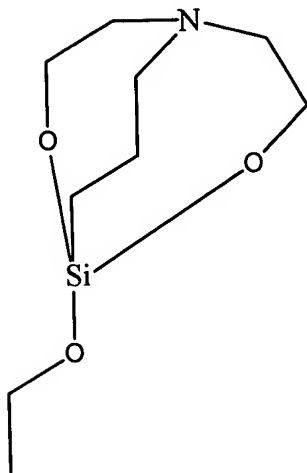
1. A cyclic silane having the formula



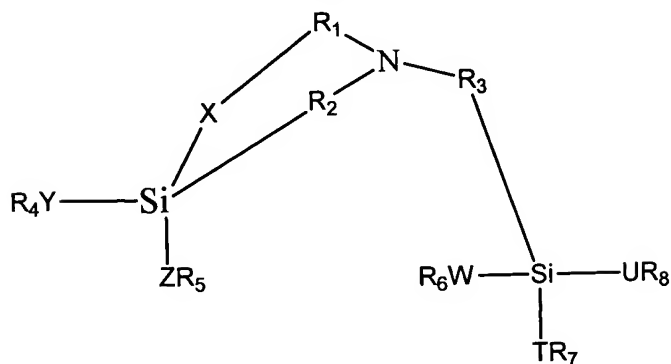
wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are independently alkyl, functionalized alkyl, aryl or alkoxy and X, Y and Z are independently a bond, O, S, NR<sub>5</sub>, wherein R<sub>5</sub> is H, alkyl, substituted alkyl, or aryl.

2. A cyclic silane according to claim 1 wherein X, Y and Z are O.
3. A cyclic silane according to claim 2 wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub> and R<sub>4</sub> are independently C<sub>1</sub> to C<sub>10</sub> alkyl.
4. A cyclic silane according to claim 3 wherein R<sub>1</sub>, R<sub>2</sub> and R<sub>4</sub> are ethyl.
5. A cyclic silane according to claim 3 wherein R<sub>1</sub> and R<sub>2</sub> are ethyl and R<sub>4</sub> is methyl.
6. A cyclic silane according to claim 4 wherein R<sub>3</sub> is propyl.
7. A cyclic silane according to claim 1 wherein R<sub>1</sub> and R<sub>2</sub> are alkoxy.
8. A cyclic silane according to claim 1 wherein R<sub>1</sub> and R<sub>2</sub> are (CH<sub>2</sub>CH<sub>2</sub>O)<sub>n</sub> wherein n is 1-4 and X and Y are bonds and Z is O.

9. A cyclic silane having the formula



10. A cyclic silane having the formula



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$  and  $R_8$  are independently alkyl, functionalized alkyl, aryl or alkoxy and T, R, U, X, Y, Z are independently a bond, O, S,  $NR_9$ , wherein  $R_9$  is H, alkyl, substituted alkyl, or aryl.

11. A cyclic silane according to claim 10 wherein T, R, U, X, Y, Z are O.

12. A cyclic silane according to claim 11 wherein  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ , and  $R_8$  are ethyl.

13. A cyclic silane according to claim 11 wherein wherein  $R_1, R_2, R_3, R_4, R_5, R_6, R_7$  and  $R_8$  are, independently,  $C_1$  to  $C_{10}$  alkyl.

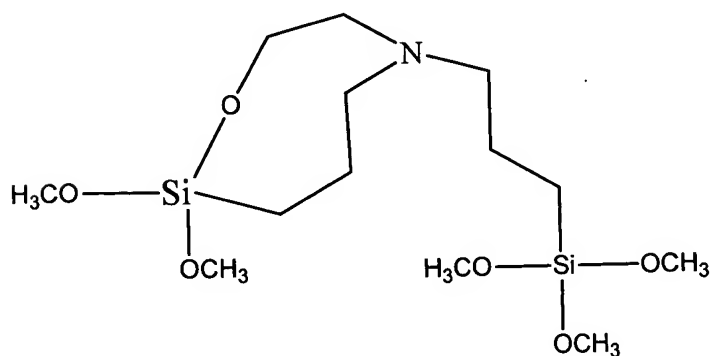
14. A cyclic silane according to claim 13 wherein  $R_4, R_5, R_6, R_7$  and  $R_8$  are methyl.

15. A cyclic silane according to claim 14 wherein  $R_1$  is ethyl,  $R_2$  is propyl and  $R_3$  is propyl.

16. A cyclic silane according to claim 10 wherein  $R_1$  is alkoxy.

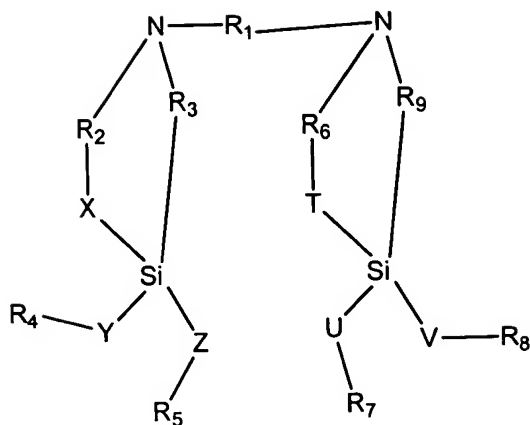
17. A cyclic silane according to claim 16 wherein  $R_1$  is  $(CH_2CH_2O)_n$  wherein  $n$  is 1-4 and  $X$  is a bond.

18. A cyclic silane having the formula



19. A composition of matter comprising a substantially pure cyclic silane according to any of claims 1-18, above.

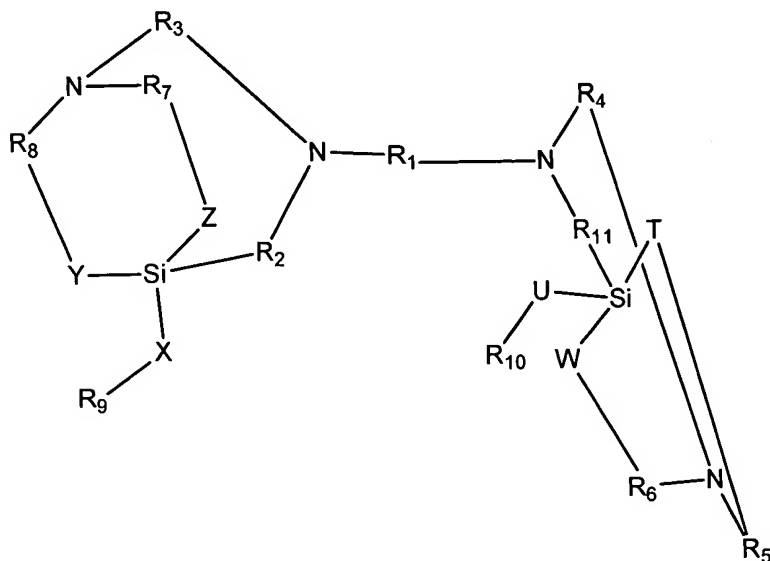
20. A cyclic silane having the fomula



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ , and  $R_9$  are alkyl, substituted alkyl, aryl, or alkoxy; and  $T$ ,  $U$ ,  $V$ ,  $X$ ,  $Y$ , and  $Z$  are  $O$ ,  $S$ ,  $NHR_{10}$ , wherein  $R_{10}$  is  $H$ , alkyl, substituted alkyl, or aryl.

21. A cyclic silane according to claim 20 wherein  $R_1$ ,  $R_2$ , and  $R_6$  are ethyl,  $R_4$ ,  $R_5$ ,  $R_7$  and  $R_8$  are methyl and  $R_3$  and  $R_9$  are propyl ( $-CH_2-$ )<sub>3</sub>; and  $T$ ,  $U$ ,  $V$ ,  $X$ ,  $Y$ , and  $Z$  are  $O$ .

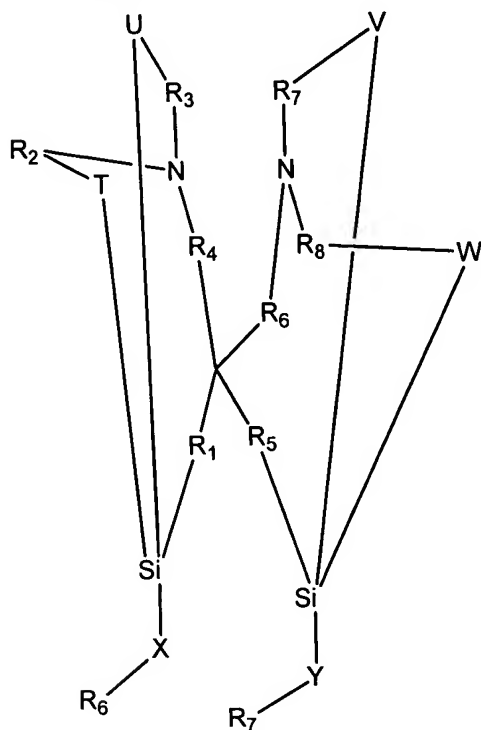
22. A cyclic silane having the formula:



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ ,  $R_9$ ,  $R_{10}$  and  $R_{11}$  are alkyl, substituted alkyl, aryl, or alkoxy and  $T$ ,  $U$ ,  $W$ ,  $X$ ,  $Y$ , and  $Z$  are  $O$ ,  $S$ ,  $NHR_{12}$ , wherein  $R_{12}$  is  $H$ , alkyl, substituted alkyl, or aryl.

23. A cyclic silane according to claim 22 wherein T, U, W, X, Y and Z are O; and R<sub>1</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub> are ethyl, R<sub>2</sub> and R<sub>11</sub> are propyl (-CH<sub>2</sub>-)<sub>3</sub>, and R<sub>9</sub> and R<sub>10</sub> are methyl.

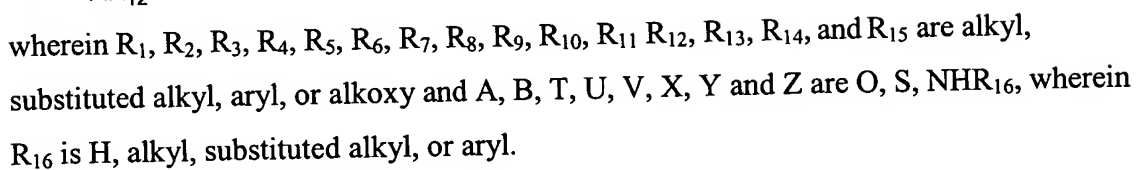
24. A cyclic silane having the formula:



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, and R<sub>8</sub> are alkyl, substituted alkyl, aryl, or alkoxy and T, W, X, and Y are O, S, NHR<sub>11</sub>, wherein R<sub>11</sub> is H, alkyl, substituted alkyl, or aryl.

25. A cyclic silane according to claim 24 wherein R<sub>6</sub> and R<sub>7</sub> are methyl, R<sub>1</sub> and R<sub>5</sub> are propyl (-CH<sub>2</sub>-)<sub>3</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, and R<sub>8</sub> are ethyl and T, W, X, and Y are O.

26. A cyclic silane having the formula:



27. A cyclic silane according to claim 26 wherein R<sub>4</sub>, R<sub>11</sub>, and R<sub>15</sub> are propyl (-CH<sub>2</sub>)<sub>3</sub>, R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, R<sub>10</sub>, R<sub>12</sub>, R<sub>13</sub>, R<sub>14</sub> are ethyl, and A, B, T, U, V, X, Y and Z are O.

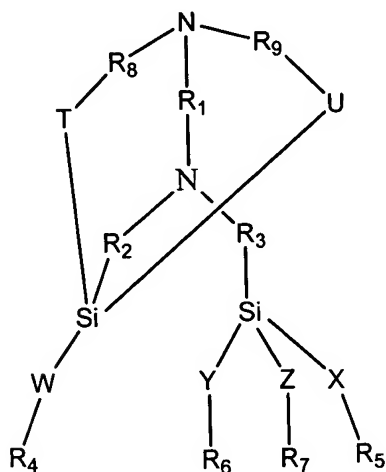
28. A cyclic silane having the formula



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, and R<sub>9</sub>, are alkyl, substituted alkyl, aryl, or alkoxy and T, U, W, X, Y and Z are O, S, NHR<sub>10</sub>, wherein R<sub>10</sub> is H, alkyl, substituted alkyl, or aryl.

29. A cyclic silane according to claim 28 wherein R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are propyl (-CH<sub>2</sub>-)<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, and R<sub>9</sub> are ethyl and T, U, W, X, Y, and Z are O.

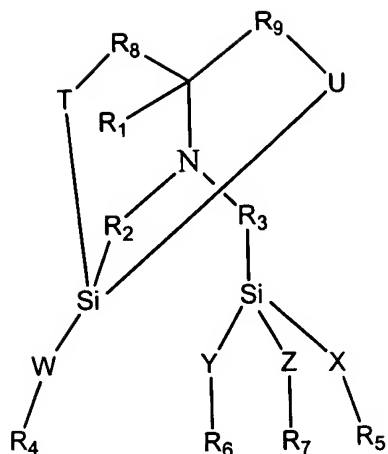
30. A cyclic silane having the formula



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, and R<sub>9</sub>, are alkyl, substituted alkyl, aryl, or alkoxy and T, U, W, X, Y and Z are O, S, NHR<sub>10</sub>, wherein R<sub>10</sub> is H, alkyl, substituted alkyl, or aryl.

31. A cyclic silane according to claim 30 wherein R<sub>1</sub>, R<sub>2</sub> and R<sub>3</sub> are propyl (-CH<sub>2</sub>-)<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, and R<sub>9</sub> are ethyl and T, U, W, X, Y, and Z are O.

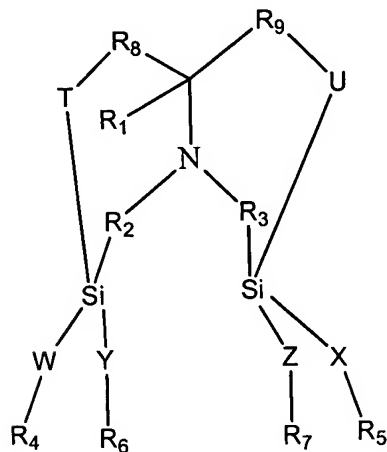
32. A cyclic silane having the formula



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ , and  $R_9$ , are alkyl, substituted alkyl, aryl, or alkoxy and  $T$ ,  $U$ ,  $W$ ,  $X$ ,  $Y$  and  $Z$  are  $O$ ,  $S$ ,  $NHR_{10}$ , wherein  $R_{10}$  is  $H$ , alkyl, substituted alkyl, or aryl.

33. A cyclic silane according to claim 32 wherein  $R_2$  and  $R_3$  are propyl  $(-CH_2-)_3$ ,  $R_1$ ,  $R_8$  and  $R_9$  is methyl,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$  are ethyl and  $T$ ,  $U$ ,  $W$ ,  $X$ ,  $Y$ , and  $Z$  are  $O$ .

34. A cyclic silane having the formula

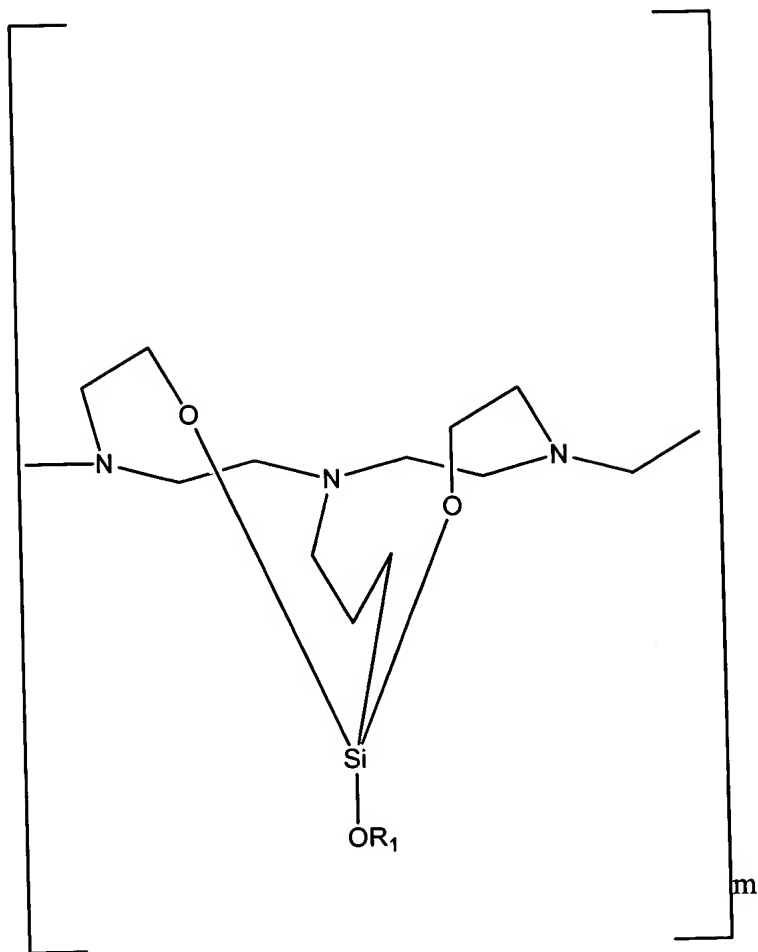


wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$ ,  $R_8$ , and  $R_9$ , are alkyl, substituted alkyl, aryl, or alkoxy and  $T$ ,  $U$ ,  $W$ ,  $X$ ,  $Y$  and  $Z$  are  $O$ ,  $S$ ,  $NHR_{10}$ , wherein  $R_{10}$  is  $H$ , alkyl, substituted alkyl, or aryl.

35. A cyclic silane according to claim 34 wherein  $R_2$  and  $R_3$  are propyl  $(-CH_2-)_3$ ,  $R_1$ ,  $R_8$  and  $R_9$  are methyl,  $R_4$ ,  $R_5$ ,  $R_6$ ,  $R_7$  are ethyl and  $T$ ,  $U$ ,  $W$ ,  $X$ ,  $Y$ , and  $Z$  are  $O$ .



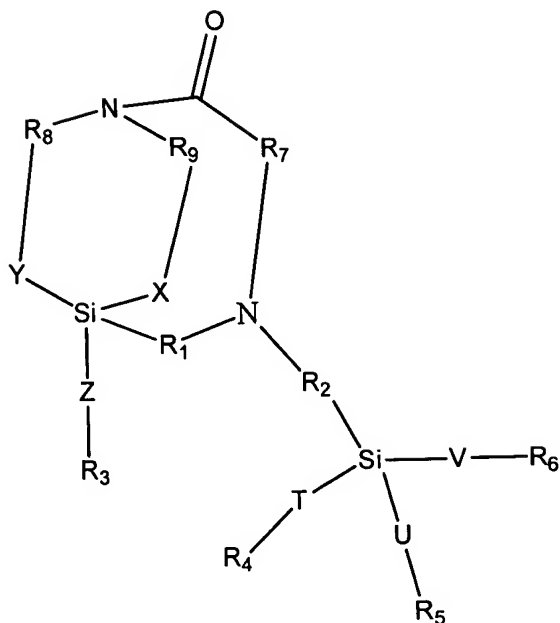
36. A cyclic silane having the formula:



wherein R<sub>1</sub> is alkyl, substituted alkyl, aryl, or alkoxy and repeating and m is an interger from 5 to 10,000.

37. A cyclic silane according to claim 36 wherein R<sub>1</sub> is methyl or ethyl.

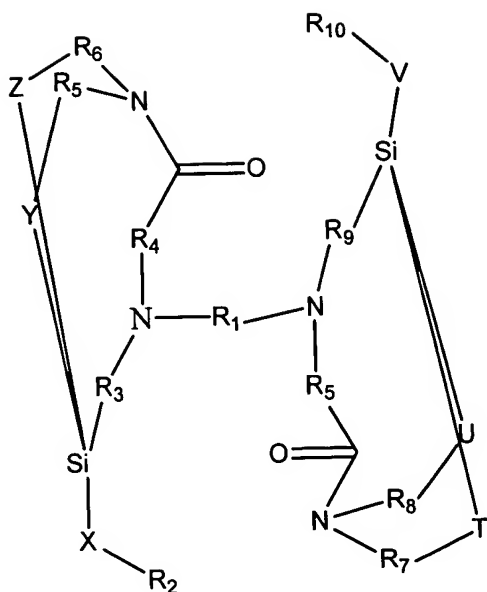
38. A cyclic silane having the formula



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, and R<sub>9</sub>, are alkyl, substituted alkyl, aryl, or alkoxy and T, U, V, X, Y and Z are O, S, NHR<sub>10</sub>, wherein R<sub>10</sub> is H, alkyl, substituted alkyl, or aryl.

39. A cyclic silane according to claim 38 wherein R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub> and R<sub>6</sub> are methyl, R<sub>1</sub> and R<sub>2</sub> are propyl (-CH<sub>2</sub>)<sub>3</sub>, R<sub>7</sub>, R<sub>8</sub>, and R<sub>9</sub> are ethyl and T, U, V, X, Y and Z are O.

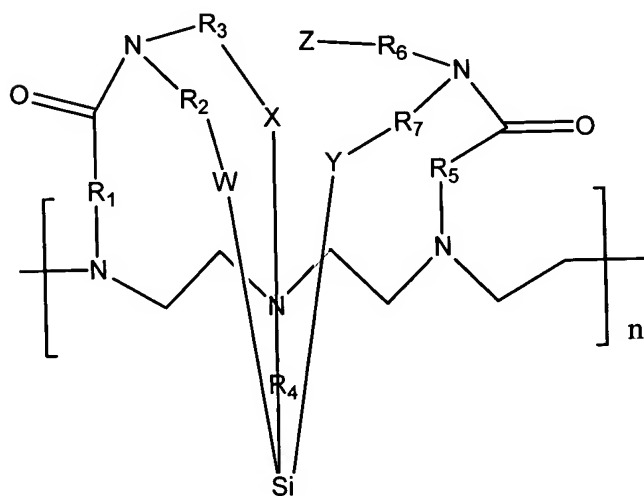
40. A cyclic silane having the formula



wherein R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub>, R<sub>8</sub>, R<sub>9</sub>, and R<sub>10</sub> are alkyl, substituted alkyl, aryl, or alkoxy and T, U, V, X, Y and Z are O, S, NHR<sub>11</sub>, wherein R<sub>11</sub> is H, alkyl, substituted alkyl, or aryl.

41. A cyclic silane according to claim 40 wherein R<sub>1</sub>, R<sub>4</sub>, R<sub>5</sub>, R<sub>6</sub>, R<sub>7</sub> and R<sub>8</sub> are ethyl, R<sub>3</sub> and R<sub>9</sub> are propyl, R<sub>2</sub> and R<sub>10</sub> are methyl, and T, U, V, X, Y, and Z are O.

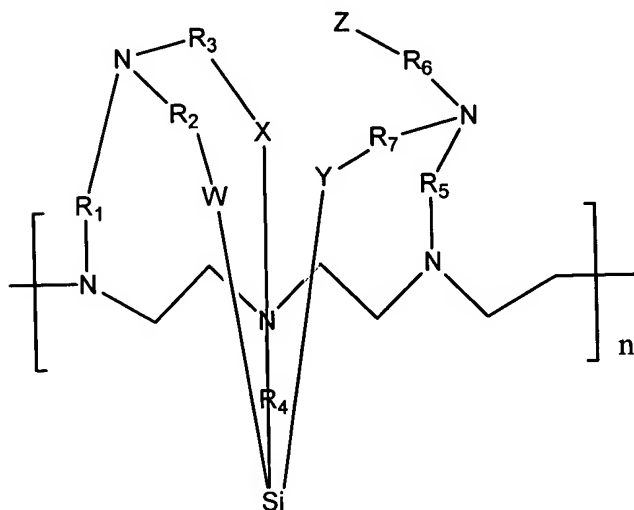
42. A cyclic silane having the formula



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ , and  $R_7$  are alkyl, substituted alkyl, aryl, or alkoxy and W, X, Y and Z are O, OH, S,  $NHR_8$ , wherein  $R_8$  is H, alkyl, substituted alkyl, or aryl and n is an integer from 5 to 10,000.

43. A cyclic silane according to claim 42 wherein  $R_4$  is propyl,  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_5$ ,  $R_6$ , and  $R_7$  are ethyl and W, X, Y and Z are O or OH.

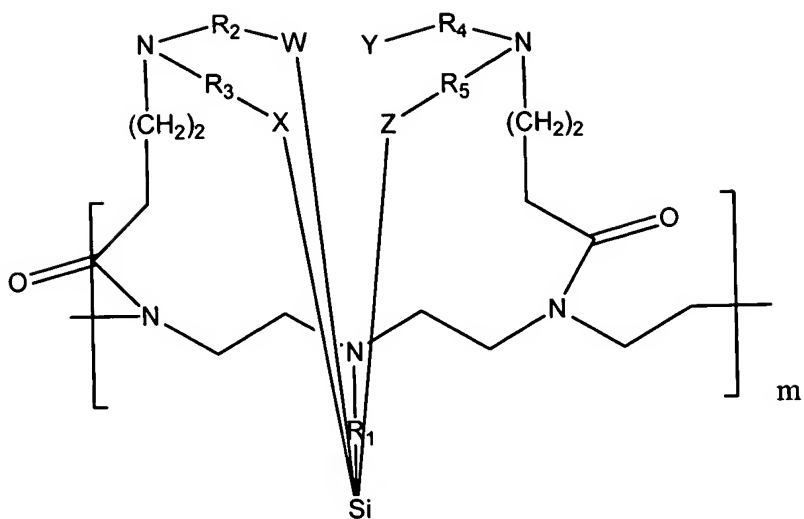
44. A cyclic silane having the formula



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$ ,  $R_5$ ,  $R_6$ , and  $R_7$  are alkyl, substituted alkyl, aryl, or alkoxy and W, X, Y and Z are O, OH, S,  $NHR_8$ , wherein  $R_8$  is H, alkyl, substituted alkyl, or aryl and n is an integer from 5 to 10,000.

45. A cyclic silane according to claim 44 wherein  $R_4$  is propyl,  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_5$ ,  $R_6$ , and  $R_7$  are ethyl and W, X, Y and Z are O or OH.

46. A cyclic silane having the formula



wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  are alkyl, substituted alkyl, aryl, or alkoxy and  $W$ ,  $X$ ,  $Y$  and  $Z$  are  $O$ ,  $OH$ ,  $S$ ,  $NHR_6$ , wherein  $R_6$  is  $H$ , alkyl, substituted alkyl, or aryl and  $m$  is an integer from 5 to 10,000.

47. A cyclic silane according to claim 46 wherein  $R_1$  is propyl  $(-CH_2-)_3$ ,  $R_1$ ,  $R_2$ ,  $R_3$ , and  $R_5$  are ethyl and  $W$ ,  $X$ ,  $Y$  and  $Z$  are  $O$  or  $OH$ .

48. A composition of matter comprising a substantially pure cyclic silane according to any of claims 20-47, above.